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DATA PROCESSING DIGEST

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Systems Design

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"Accounting system design problems"

F. J. Porter, Jr., Consolidated Edison Co., New York

AMERICAN GAS ASSOCIATION MONTHLY, February 1956; pages 25–27

Complete files on tape with daily print-outs for "information centers"

Consolidated Edison found that they required more time than they had anticipated to design suitable accounting systems for their electronic computer installation (IBM 705, two Univacs). They have proceeded on the assumption that they would apply the computers to their present systems, and once they had acquired some facility with the installation, they would review the accounting system design to see whether a thorough revision were justified.

One problem they encountered early in designing the accounting system was the format of the basic files. Some of the questions were: What data are to be retained in the file? How many digits or characters of file space per customer or per employee are needed? In what order will data be organized within the file? Will space be provided on every account for every possible condition, or will some method of varying the size of the record with customer or employee be adopted?

In resolving these questions, they found it necessary to balance the cost of larger files against the desirability of having all the data they wanted. They have tended toward having more data in the beginning, cutting down later where they could.

The payroll and customer file formats call for a maximum of 500 characters per employee and 360 to 600 per customer. Up-dating the customer history file is done by posting cash, meter readings, changes in account data, adjustments, etc. This file maintenance takes about one-third of the time allocated to customer accounting. In order to provide information for inquiries and to carry out the collection system, up-dating is done every seven working days. With the electronic system, the cost of supplying accounting data to other departments can be computed accurately, and thus the need for information can be weighed against the cost of producing it.

Periodic print-outs of the complete customer history file are made so that information clerks, auditors and others can refer to data visually. These print-outs are of two types: 1) a complete printing of the master file once each billing cycle of 42 days; 2) interim printing of all postings to the master file (journal vouchers, turn-ons and turn-offs, cash receipts, etc.) By reference to the master print-out, the information clerk can answer questions now answerable from the punch card and meter book data. "It is this print-out requirement which has caused many of us to desire high speed printing devices....In Con Edison's case, print-out will amount to nearly 650,000 120 character lines per day. Conventional equipment is too slow and too expensive for such volumes."

"Information Stations," in each of which three clerks will handle 63,000 accounts, will provide any information needed by anyone in the organization. In addition, these clerks will review all incoming documents to verify data and correct any errors before they are prepared for transfer to magnetic tape.

Another problem posed by the author, but not discussed in the article, is in what sequence should changes in the master file accounts be made.

Con Edison has 60 or 70 possible types of changes for each account (for example: payments, address changes, credits, etc.), and they can occur in almost any combination.

Con Edison feels that programming and system design should progress together and that each group should know something about the other field. Also, that while system designs may be similar in most utilities companies, each company will have programming problems peculiar to its own operation.

(See also DPD, July 1955, page 3: "Consolidated Edison and electronics.")

Equipment

"Electronic point-of-sale accounting"

SYSTEMS, November–December 1955; pages 22–23.

Department store automation begins with sales tag

Telecomputing Corporation has been testing its Point O' Sale Recorder in a West Coast department store and will have it ready for the market by 1957. The Point O' Sale Recorder is a three unit machine consisting of a tag reader (Kimball or Dennison punched garment tags), a keyboard, and a tape perforator. The sales person inserts the garment tag which reads the perforations giving price, color, size, etc. He manually enters tax and additional information (or the price, if there is no tag) along with his code number on the keyboard. If the sale is a charge, the customer's account number is recorded either manually or through the use of a special customer's token, read in the same manner as the price tag.

Every day the paper tapes are collected and used as inputs to the File Computer or the Remington Rand punched card computer. The system makes possible the automatic preparation of each day's accounting and statistical records, such as sales audit totals, accounts receivable, unit control, and merchandise statistics. The system can also be used for taking an automatic physical inventory by reading and recording the perforated price tags of unsold merchandise.

"Office Automation" Updating Service Newsletters and Supplements No. 2, 3, 4.*

R. Hunt Brown, Automation Consultants

Airlines and railroads use Reservisor systems

Of particular interest in these supplements to the book are two articles about Teleregister Reservisor systems. The article in No. 3 describes the system designed specifically for railroads and recently ordered by the New Haven, New York Central and Santa Fe Railroads. Supplement No. 4 includes material on the Reservisor systems designed for American, United, National, and Braniff airlines. Although the equipment is similar, each application has its own specific requirements.

The system for the railroads can handle 17 different types of transactions, including many types for "off-line" cases (reservations or inquiries which involve other railroads). Information is recorded in magnetic memory storage, centrally located. Each ticket agent and reservations clerk has an Agent's Keyset, upon which he enters each transaction, including availability check, reservation, sale, and cancellation of space. The agent inserts in the Keyset a train plate, notched with a code for a specific train, manually enters the departure date information, and moves the availability lever.

The eight car key-lamps light to show what is available. If the passenger wishes to reserve space, the agent presses other keys to make the reservation.

Reservations are recorded in the magnetic memory. At the end of the day, the electronic equipment cancels all reservations which have expired without being picked up, making the space again available for sale. Space which is sold is recorded in the same way.

The system handles reservations, sales, and cancellations for a period of seven months in advance. Less common transactions, such as off-line requests are channeled to central control clerks for immediate processing.

Airlines reservations systems operate in a similar manner. (See also DPD, April 1955, page 7--"Magnetic drums store plane flight data"; June 1955, page 7--"Electronic reservation system for New Haven"; September 1955, page 9--"NYC to install electronic reservation system"; February 1956, page 3--"...Railroading schedules ahead for nation-wide pulse-controlled traffic.")

Kidde Warehousing System

In supplement No. 4 the Kidde Warehousing System is described in detail. This system combines the advantages of bulk picking with the desirable features of order picking. Pickers can select the items from any one location for a large number of different orders at one time, then move to the next bin and pick all the orders needed from that location.

Incoming orders are broken down by items requested on punched cards, along with the customer's information. The cards are arranged according to warehouse location and given to the picker. As he picks the merchandise, he places it along with its card on a conveyor carrier tray, which moves to the dispatch area. The dispatcher inserts the card into an automatic card reader which activates the carrier controls so that the tray discharges its load at a chute serving a particular customer, truck, or route.

(See also DPD June 1955, page 12--"Control components provide new ways to handle materials.")

Hillyer Transacter

The Hillyer Transacter (also described in No. 4) is an automatic input device which transmits data from the source to a central data-processing office. An example of the use of this device is the automatic recording of job information, such as job number, beginning and ending times, employee identification, etc. In this example, the employee would insert a coded job ticket, and his identification badge, and set the "in" key. This would automatically record the time he began a job, the job number, and his employee number--information which would be transmitted automatically to a data recording center for later use in computing his paycheck.

* See DPD November 1955, page 7 for review of the book "Office Automation."

"First 'Ferractor' fitted computer produced by Sperry Rand"

JOURNAL OF MACHINE ACCOUNTING, February 1956; page 20.

"Remington Rand Division (Sperry Rand Corp.)"

JOURNAL of Association for Computing Machinery
(Digital Computer Newsletter), January 1956, page 54.

The new computer designed by Remington Rand Division of Sperry Rand uses tiny magnetic amplifiers instead of filament tubes or transistors. It is the first computer utilizing magnetics throughout.

"New coding systems broaden data processing"

P. B. Garrott, Standard Register Co., Dayton, Ohio
AUTOMATION, January 1956; pages 70–76.

Integrated data processing and "common language" machines are not limited to the familiar punched paper tape for the recording of original information. The metallic ink spot code, and character recognition are methods of automatically reading information from documents, to be used as inputs in an electronic data processing system. The Scandex system, manufactured by the Farrington Manufacturing Company and Intelligent Machines Research Corporation, and the Stanomatic, by Standard Register, are examples.

"Tools of the office--a review of current office equipment"

OFFICE MANAGEMENT, January 1956; pages 83 et al.

Here is a comprehensive review of all types of office equipment available today, which help management do a better job by furnishing better information, faster. Fifty-seven companies manufacturing IDP equipment are listed, beginning on page 133, along with brief descriptions of their general line of products.

"Tools of the office--equipment for integrated data processing"

OFFICE MANAGEMENT, February 1956; pages 50–78.

Here is a rather detailed article on the equipment and purposes of integrated data processing, but with little mention of the more basic philosophy of business systems which underlies the IDP concept. A list is given of 66 manufacturers of IDP equipment, along with a brief description of their general line of products. The list is similar to the one mentioned above.

Applications

"Is the electronic office inevitable?"

Robert E. Slater, John Hancock Mutual Life Insurance Co., Boston, Mass.
SYSTEMS, November–December 1955; pages 6, 7.

Complete company files on magnetic tape

The answer to the title, as contained in the article is an emphatic "yes." In light of the 95 million punched cards the company needs each year, its decision to turn to electronic data processing was an inevitable one. The use of magnetic tape for records will reduce duplication which accounts for one-third of the present card files. The number of machines will also be reduced. The company's studies have also shown that it is advisable to use electronic equipment for more than one shift, both for economy, and because there is less breakdown time. They believe the new equipment will up-grade present job levels, and they anticipate better internal control. Obsolescence does not seem an important factor, since they believe the manufacturers will up-date present equipment. They have conservatively planned for a 10 to 12-year write-off period.

"That machine"

C. A. Marquardt, State Farm Mutual Automobile Insurance Company
BEST'S INSURANCE NEWS (Life Edition), January 1956; pages 45, 48, 49.

Selective underwriting by electronics

State Mutual uses its IBM 650 to perform selective underwriting, based on the fact-finding, fact-sorting, and fact-comparing functions of the computer. The computer points out the risks for human judgment based on company experience and observation of the facts. Automatic rating is another use the company is making of the 650. These applications are founded on the belief of the company that "the truly new dimension introduced to business procedures is the ability of the data processing machine to make possible mechanization of *special* functions and operations not heretofore possible for a company's or a whole industry's *particular* needs."

"Pan American Airways hires IBM 705"

JOURNAL OF MACHINE ACCOUNTING, January 1956; pages 16, 17.

Pan American's new IBM 705 system will provide sales information, solve crew scheduling problems, speed billing, provide precise control of inventory, and "affect our long-range thinking on reservations control, on processing payrolls, and on how we are selling our product."

General Information

"Planning for the arrival of electronic data processing"

Richard G. Canning, Canning, Sisson and Associates, Los Angeles
JOURNAL OF MACHINE ACCOUNTING, January 1956; pages 22, 23, 30.

Plan for electronics through "information engineering"

"Information engineering" is suggested for improving the typical pattern being followed today by most companies in planning for electronic data processing equipment.

Information engineering is defined as the "optimum design of an information system--all things considered. This is not a superficial use of the word 'engineering,' as all of the aspects of true engineering are present." Using the engineering techniques, "a company is seen as trying to accomplish some objective--a production schedule set by management, a sales quota, and so on. Then, the information engineer asks, what information *must* flow in order for the company to accomplish that objective." Information should not be considered as merely red tape. Rather it should be treated with "almost equal respect as the physical product that the company handles."

Several aspects of information engineering are presented:

"...the information engineer looks at the company as a control system, very similar to a guided missile control system....These design techniques [which are used in guided missile design] tell the engineer what information should be recorded, how often it should be recorded, and what processing should be done, in order to achieve an optimum control system." In a business this would be interpreted as "an organization that follows management's orders with a minimum deviation (even considering the unpredicableness of the humans). When a change of orders occurs, the organization responds in a satisfactory time, and with no 'oscillations.'"

"Another aspect of information engineering calls for handling information in a different manner from the past....Departments can be widely scattered in a company, and still use the same electronic inventory file. Physical control of operations will no longer be considered separately from financial control; for instance, cost accounting figures and production control progress reports are simply two uses of the same basic information."

There are better ways than punched cards

A third aspect of information engineering is the use of new techniques. "In every case I have studied, wherever punched cards were proposed, much better methods could soon be uncovered; for example, point-of-transaction recorders to pick up the input data. As the systems planners become familiar with these alternative methods--their power, economy, and efficiency--I suspect that punched cards may go out at an even faster speed than the horse."

Another new technique is the larger volume random access memory for holding all company files. Up to now human clerks, punched card machines,

and magnetic tape processing systems have followed the principle of "batching." With the coming random access memories, however, "the system will be working on one type of work for a few milliseconds, and a completely different type for the next few milliseconds. *As a matter of routine,* the system will stop what it is doing in order to handle a higher priority job."

"Electronics for the office--how much? how soon?"

Joseph H. Pittenger, Armstrong Cork Co., Lancaster, Pa.
N.A.C.A. BULLETIN, February 1956; pages 773-777.

Five steps in preparing for an electronic installation

This article for management personnel on investigating the use of electronics, follows the generally accepted pattern of such articles, but in a simple, straight-forward way for easy and quick reading. Five steps are suggested for carrying out the investigation:

1. "Learn as much as possible about the characteristics of the various types of electronic machines through schools maintained by manufacturers, conferences, and personal contacts with companies using or planning to use such machines.

2. "With the possible assistance of outside consultants, select areas of study, time schedules for progress reports, etc.

3. "Review each work process in sufficient detail to derive answers to the following questions:

   a. Is it possible to integrate the process through improved methods and/or changes in organization?

   b. What savings can be effected by the process of integration?

   c. Can the process be performed economically with an electronic machine?

   d. What savings can be obtained by placing the process on the electronic machine, exclusive of the savings possible through integration?

4. "According to pre-arranged schedules, confer at frequent intervals during the course of the investigation with management to bring out suggested changes for management consideration and decision and to keep the course of the study on the right track.

5. "Submit a final report at the conclusion of the survey, covering the following items:

   a. Recommendation for an immediate detailed study to develop fully and install all methods and organization changes which were considered to be feasible during the course of the survey.

   b. Recommendation for action to be taken on purchase or rental

of an electronic computer. This recommendation should be backed up from an economic standpoint only by savings which can be effected with the use of the machine."

"Translation by Machine"

William N. Locke
SCIENTIFIC AMERICAN, January 1956; pages 29–33.

Automatic translation will increase scientific interchange

Only 50% of the world's scientific papers are published in English. Countless valuable articles written in German, French, Russian, and other languages are never utilized, simply because they have never been translated. Good translators are rare, and translation is expensive. Knowing what is worth translating is another problem.

Since 1949 work has been progressing on the development of machine translation at M.I.T., UCLA, University of Washington, Institute for Advanced Study at Princeton, in London, and in other localities. In 1952 the first conference was held at M.I.T.

Much preliminary research in language patterns must be done before machines can be adapted to the translating job.

The actual machine translation process is in five steps:

1. "Feeding the original text—written or spoken—into the machine.
2. "Transforming this text into symbols the machine can handle.
3. "Translating the meaning from one language to another.
4. "Turning the translation back into conventional words or other units in the new language.
5. "Presenting the translated text in readable or audible form."

The author guesses that "within five years...there should be in operation one or more models [of machines] turning out a good deal better than a word-by-word translation."

"Where do we stand today?"

OFFICE MANAGEMENT, January 1956
"Office Automation, 1956--fact and fantasy," pages 14–16, 186–190.

"Automation is an evolution, not a revolution," pages 17–18, 193–199.

"Punched cards--are they obsolete?" pages 19–20, 191–192.

Magnetic storage has advantages over punched cards

The first of this series of articles under the general title "Where do we stand today?" is a somewhat elementary review of the history, and preview of the future of automatic data processing in the office. It is of value to those

beginning to learn about the subject. The second article, too, may be of value to those who have never before considered the meaning and implications of electronic computing equipment. The third article, however, introduces a controversial subject which is being discussed more and more frequently by advocates of punched card systems and the pioneers in the use of magnetic memory and computing systems. Operating speed, density of storage, economy of space, and re-usability are some of the advantages of magnetic tape, drums, and cores over punched cards. New developments in magnetic storage promise even greater advantages.

"A progress report--mechanization of check handling"

John A. Kley, County Trust Co., White Plains, N. Y.
BANKING, February 1956; pages 60–62.

A report is given of the Technical Subcommittee on Mechanization of Check Handling for the American Banking Association. Standard placement of common language information on all checks, methods of prequalifying data, and selection of the best possible common language code are the problems being considered by the committee. A more complete analysis of the problems of bank automation is contained in the booklet prepared by the A.B.A. and submitted to interested manufacturers in 1954.

(See also DPD, April 1955, page 2: "Automation of Bank Operating Procedure.")

"Programming for electronics--a 'man-sized job'"

W. E. Eggleston, Commonwealth Edison Co., Chicago

This paper presents an outline of Commonwealth's plan for studying the use of electronic equipment, the selection of the IBM 702, the selection and training of personnel, the design of the system, the use of magnetic tape as the main information file, and the correlation with parts of the original system.

A copy of the paper may be obtained by writing to: American Gas Association, 420 Lexington Ave., New York 17, New York.

(See also DPD, July 1955, page 7: "Programming for electronics.")

"Glossary of terms in the field of computers and automation"

COMPUTERS AND AUTOMATION, December 1955; pages 15–31.

The third edition of the Glossary includes technical, programming, and mathematical definitions of electronic computers, punch card devices, and related equipment.

"Machines and men in accounting operations"

John H. Zebley, Jr., Turner, Crook & Zebley, Philadelphia, Pa.

"Be ready for automation or you'll no longer compete"

J. C. Hodges, Canadian National Railways, Montreal, Canada

"Use present machines to compete with electronics"

Paul Kircher, University of California, Los Angeles

"Preparing for electronics is rough but rewarding"

Emerson F. Cooley, Prudential Insurance Co., Newark, N. J.

"Systems man must become more of a generalist"

Edmund D. Dwyer, Department of the Navy, Washington, D. C.

"Banks give attention to automation and leadership."

Fred F. Florence, Republic National Bank of Dallas

THE OFFICE, January 1956; pages 69–83.

Some generalizations on the status of electronics in business, and planning for their use.

Management Decision-making Techniques

"An appreciation of systems analysis"

Charles Hitch, The RAND Corp.
JOURNAL of the Operations Research Society of America, November 1955; pages 466–481.

A mating of minds and machines best solves complex systems problems

((This study of long-range system analysis concerns military systems, but contains many ideas and points out problems which face top management in making long-range plans for new products, production levels, etc.))

Formerly, operations analyses were limited in that they considered only a small number of interdependent factors. Since the war, attempts have been made to use analysis as an aid in making military decisions in problems of greater complexity. This has been termed "systems analysis."

Operations analysis and systems analysis have the same elements:

- an objective
- alternative techniques (or "systems") by which the objective may be accomplished
- the costs or resources required
- a *model* showing the interdependence of the objectives, the techniques, the environment, and the resources
- a criterion for choosing the *preferred* or *optimal* alternative.

The application of systems analysis to (military) force composition and development decisions means we are concerned with forces two to fifteen years in the future; this fact alone increases the number of interdependent variables. "All sorts of things which are given in the short run become variables in the long run."

Big, broad problems have to be cut down to size—even the modern high-speed computers are limited. We have to "factor out" those variables that are especially important and "suppress" or "aggregate" the rest; for the most part by sheer judgment. Probably most systems analyses that go wrong, go wrong here.

Several kinds of uncertainty appear as we look further into the future:

1. "Planning factor"—attribution rates, operational errors, etc.
2. Uncertainty regarding the enemy and his reactions. ((competition?))
3. Strategic--war, cold war, or peace; if war, when, for what political objectives, etc.
4. Technological--associated with research and development.

5. Statistical--normal chance elements--often small compared to other uncertainties.

To solve the problem under these uncertainties, the problem breaks down into two parts:

1. How to compute all the "interesting" contingencies?
2. We find that some strategy is superior in some contingencies, another in others. What decision does the systems analyst recommend?

To answer the second question, the assigning of values or utility is not practical, and use of *min-maxing* (game theory) tends to be too conservative. These methods combined with judgment are actually used.

The systems analyst tries to *invent* a system which will be good for any circumstances (a "dominant" system). Or at least he calculates the cost of providing insurance against some contingencies, so that the Air Force knows these costs in making decisions. The analyst uses mixed systems.

The inclusion of enemy reactions and time phasing (i.e., decisions where sequences of events are important) are difficult. Game theory and "dynamic" models are imperfect tools for handling these problems--but are all we have.

In considering broad criteria it is often necessary to "sub-optimize," that is, optimize a sub-element choosing an appropriate lower-level criterion.

The difficulties of broad system analysis are in the problems themselves. But the consideration of *systems* is appropriate if the situation is interrelated and complex; if not, the problem should be factored and the narrower problems attacked. "Let us continue a fruitful division of labor [in science] and not all become systems analysts."

"It is utterly wrong to look upon intuition and analysis or minds and machines as rivals or alternatives. Systems analyses should be looked upon...as a framework that permits the judgment of experts in numerous sub-fields to be combined--to yield results which transcend any individual judgment."

"Proceedings," Operations Research Conference, September 29–30, 1955.

Published by Society for the Advancement of Management

OR techniques demonstrated in warehousing problem

Ten papers plus three discussion periods are reproduced in the Proceedings. The first section of two papers, presents some description and purposes of operations research. The second section of three papers presents some example studies in operations research problems. The third section is a demonstration

of an operations research study group working on an actual warehousing problem. The last two sections are concerned with the relations of the operations research staff and operating management, and the future of operations research.

The majority of the papers, and especially the spontaneous demonstration of the operations research study group, should help those who are unfamiliar with operations research to understand both the purpose and the methods of this new technique of scientific management. The language is simple, and the examples are practical and should tie in with the experience of most business management people.

Price to S.A.M. members--$7.50. Price to non-members--$10.00.

"What computers can do for you"

FACTORY, February 1956; pages 99–105.

In a Special Report, the magazine points out to factory management the possibilities for greater control over operations through the use of electronic computing systems. Areas that could be benefited by better management decision through the use of electronics are: production planning, scheduling, control; maintenance and plant engineering; methods, facilities, materials; employee relations. Ten steps are given for establishing an electronic computer system in a plant.

"Better Management = Management + Industrial Engineering + Linear Programming"

John J. Wilkinson, Methods Engineering Council, Pittsburgh, Pa.
JOURNAL OF INDUSTRIAL ENGINEERING, January–February 1956, pages 11–23.

Here is an explanation of Linear Programming which should be fairly understandable to most systems men or accountants. The language is fairly non-technical, and example problems are given. The Modi method is explained in detail using a toy manufacturer's paint booth scheduling problem for illustration.

Comment

The Western Joint Computer Conference

San Francisco, February 7–9, 1956.

(Since the Proceedings of this conference will be published, no attempt will be made to review specific papers at this time. General trends and developments are discussed.)

Emphasis on automatic programming techniques

A most evident trend at this conference was the attempt to allow computers to perform more of the tedious parts of computer programming and operation. Several papers were given describing systems which allow a scientist to express problems in ordinary mathematical notation--with the computer translating ordinary symbols into its own language. A paper by Bruse Moncrieff of RAND Corp.[1] touched on similar problems in the business field. He developed in some detail an "executive" program which directs the operation of a computing center (see below).

A paper by Douglas T. Ross of M.I.T. [2] carries to a very high level the concept of using a computer to recognize ordinary symbols. He proposes a computer which will recognize concepts such as "increase," "product x," "immediately," "minimum cost," etc. He illustrated a (theoretical) case in which the computer simulates the operation of a factory. The human can ask such questions (in ordinary language) as "What will be the inventory level, if I decrease the raw material input?" The computer would then present the answer in tabulated or graphical form, as desired.

The lack of papers on automatic programming for business applications may indicate that developments along these lines are progressing more slowly than in the scientific field. (See, however, DPD; September 1955, page 16; November 1955, page 15; December 1955, page 14; January 1956, page 8; February 1956, page 10.)

There is a growing recognition that the operation of a business computer installation is a complex problem. Such problems as scheduling work, preparing input data, insuring that the correct tapes are inserted on the correct tape units, that the proper program is used, etc., must be given serious consideration. (It is as serious as scheduling for any other $500,000–$2,000,000 production facility.)

A series of papers [3] was given by RCA on their Bizmac system. This system has many interesting features such as a large number of tape units (to eliminate frequent changing of tapes), separate sorting units, and a variety of input-output units. The series of papers stressed, to some extent, the scheduling and operation problems, which are solved in the Bizmac by an almost completely manual system (some 9–13 clerks are required to prepare work schedules.)

This manual approach to the supervision of the operation is somewhat surprising, since a computer can be instructed to perform a large part of this work quickly and accurately. Moncrieff's paper specifically illustrates that "supervisory" or "executive" programs can be written which direct the label-

ing, insertion and removal of tapes, checks that proper data is entering the computer, etc. His executive program for a 702 is, he feels, entirely feasible. Also, the work of people at M.I.T. and IBM on computers for the Sage project [4] also includes some very sophisticated techniques which allow the computer to supervise the sequencing and channeling of its own input and output data.

Random-access memories and magnetics

Much thought is going into the problem of how to effectively use random-access memories when they arrive (5, 6). We know that relatively small random-access memories (5,000,000 characters) will be available in 1–2 years. Units which could hold the entire active files of a business (100 million or more characters) may not be much further in the future. To use these effectively, thought must be given to the problem of locating data in the file, given some descriptive code (e.g., part number, customer number). This is called the *indexing* problem. No solutions were presented at this meeting, but there are indications the work is progressing.

Few real business applications were presented (the program committee chose to accent technical developments.) One application--the attempt to simulate automobile traffic by a computer [7]--should be of interest to all commuters. (It is hoped that money will be available for more traffic studies in the coming year.)

On the equipment side, two comments seem in order: The insides of Bank of America's ERMA were described [8] in some detail. This computer appears to be a good example of the fact that any data-processing problem can be solved reliably and probably economically with existing techniques and equipment, if the money for development is made available.

The second trend is toward magnetic components, which may become more important than the transistor in improving reliability and reducing the cost of commercial computers. (9, 10, 11, 12)

1) An Automatic Supervisor for the IBM 702; Bruse Moncrieff, RAND Corp.

2) Gestalt Programming: A New Concept in Automatic Programming; Douglas T. Ross, Servo Lab, M.I.T.

3) Purpose and Application of the RCA Bizmac System; Halstead, Leas, Marshall, Minett, RCA.

4) The Logical Design of a Digital Computer for a Large Scale Real-Time Application; Astrahan, Housman, Thomas, IBM Corp.

5) Requirements for a Rapid Access Data File; George Eisler, NCR Co., Electronics Div.

6) Engineering Design of a Magnetic Disk Random Access Memory; Noyes, Dickinson, IBM Corp.

7) Traffic Simulator with a Digital Computer; S. Y. Wong, Philco Corp.

8) A Fixed-Program Data-Processor for Banking Operations; Jack Goldberg, Stanford Research Institute.

9) A Progress Report on Computer Applications in Computer Design; Cray, Kisch, Remington Rand.

10) The Transfluxor: A Magnetic Gate with Stored Variable Setting; Rajchman, Lo, RCA.

11) Bilateral Magnetic Selection Systems for Large-Scale Computers; Amir H. Sepahban, Philco Corp.

12) The Magacycle Ferractor; T. H. Bonn, Remington Rand.

Training, Seminars, Meetings

The joint meeting of the Operations Research Society of America and The Institute of Management Science will be held March 30, 31 at the University of California at Los Angeles. For further information, write Milton Frank, Engineering Dept., UCLA, Los Angeles 24, Calif.

"Electronic Data Processing for Business and Industry," a five-day course offered by UCLA Extension, beginning April 16, 1956, in San Diego, California. Classes will be held from 9:00 AM to 4:00 PM each day at the U.S. Grant Hotel. Registration, $50.00. For further information, write University Extension, University of California, 1015 Seventh Avenue, San Diego 1, California. BElmont 9–9221.

"Programming and Coding Methodology for Data Processing on Digital Computers," Spring Semester courses, New York University's Management Institute. For further information write: NYU Division of General Education, 1 Washington Square North, New York, N. Y.

Southern California Business Show (N.A.C.A.) April 24–27; Ambassador Hotel, Los Angeles. For further information write: R. E. McRann, General Chairman, So. Calif. Business Show, 731 South Spring St., Los Angeles 14.

Annual Meeting, Operations Research Society of America, May 10, 11, 1956; Sheraton Park Hotel, Washington, D. C.

N.O.M.A. Conference and Annual Office Machinery and Equipment Exposition, May 20–24, 1956; Philadelphia, Pa.

National Convention, N.M.A.A., June, 1956; Shamrock-Hilton Hotel, Houston, Texas.

"Business Management and Electronic Data-Processing," Course #15.549--a one-week summer course offered by M.I.T., August 13 through August 17, 1956. Planned for those already somewhat familiar with electronic data-processing. "Operations Research," Course #15.579, offered by M.I.T., June 25 through July 7, 1956. An introductory course in the techniques of operations research For further information on Courses #15.549 and 15.579 write to: Professor Ernest H. Huntress, Director of the Summer Session, Room 7-101, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Wayne University Computation Laboratory, Summer Program:
July 23–28, "Automatic Computers--Their Application and Evaluation."
July 30–August 4, "Electronic Data Processing in Business and Government."
August 6–11, "Applications of Computers to Engineering, Science, and Industry."
For further information write to: A. W. Jacobson, Director, Computation Laboratory, Wayne University, Detroit 1, Michigan.

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American Gas Association Monthly--420 Lexington Ave., New York 17, New York.

Automation--Penton Building, Cleveland 13, Ohio.

Automation Consultants, Inc.--1450 Broadway, New York 18, N. Y.

Banking--12 East 36th Street, New York 16, N. Y.

Best's Insurance News--75 Fulton Street, New York 38, N. Y.

Computers and Automation--513 Avenue of the Americas, New York 11, N. Y.

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Systems for Modern Management--315 Fourth Avenue, New York 10, N. Y.

See DPD September 1955 for list of more than sixty periodicals regularly reviewed for significant information in the data processing and related fields.

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